Stoller
Hanford Office

DOE-EM/GJ668-2004

299-W22-12 (A7837)
Log Data Report

Borehole Information:

Borehole: 299-W22-12 (A7837)			Site: 216-S-7 Crib		
Coordinates (WA St Plane)		GWL[1] (ft) : None		GWL Date: 05/04/04	
North	East	Drill Date	TOC[2] Elevation (ft)	Total Depth (ft)	Type
134184.891 m	567191.077 m	01/56	682.80	321	Cable

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	3.0	8 5/8	8	5/16	+ 3.0	321
Welded Steel	0	4.5	4	0.25	0	194

Borehole Notes:

The logging engineer used a caliper to determine the 8-in. outside casing diameter. The caliper and casing stickup were both measured using a steel tape. Inside casing diameter was measured with a steel tape. All measurements were rounded to the nearest 1/16 in. Total depth (321 ft) of the casing is derived from Ledgerwood (1993). It is reported in Ledgerwood (1993) that grout was emplaced between the 4- and 8-in. annular space from the ground surface to 194 ft. Total logging depth was 233 ft. The logging engineer measured the depth to water. Coordinates and top of casing (TOC) elevation are derived from HWIS[3]. Logging data acquisition is referenced to the TOC.

Logging Equipment Information:

Logging System:	Gamma 1G		Type:	SGLS (35%) SN: 34TP10967A
Calibration Date:	01/04	Calibration Reference:	GJO-2004-597-TAC	
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3 Repeat	4	
Date	05/04/04	05/05/04	05/06/04	05/06/04	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	233.0	122.0	67.0	23.0	
Finish Depth (ft)	121.0	22.0	45.0	3.0	
Count Time (sec)	200	200	200	200	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	1.0	1.0	1.0	1.0	
ft/min	N/A[4]	N/A	N/A	N/A	

Log Run	1	2	3 Repeat	4	
Pre-Verification	AG079CAB	AG080CAB	AG081CAB	AG081CAB	
Start File	AG079000	AG080000	AG081000	AG081023	
Finish File	AG079102	AG080100	AG081022	AG081043	
Post-Verification	AG079CAA	AG080CAA	AG081CAA	AG081CAA	
Depth Return Error (in.)	-1	-1	N/A	N/A	
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.	

Logging Operation Notes:

Logging was conducted without a centralizer on the sonde and measurements are referenced to TOC. A repeat section was collected in this borehole to evaluate system performance.

Analysis Notes:

Analyst:	Henwood	Date:	05/17/04	Reference:	GJO-HGLP 1.6.3, Rev. 0

Pre-run and post-run verifications for the logging system were performed before and after each day's data acquisition. The acceptance criteria were met.

A combined casing correction for the 8- and 4-in. casings of 0.5625 in. (0.3125 + 0.25) was applied to a depth of 194 ft. A correction for 0.3125-in.-thick casing was applied from 194 ft to total depth of the borehole.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G1GJan04.xls using an efficiency function determined from annual calibrations. Dead time and water corrections were not necessary.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclides (^{137}Cs, ^{60}Co, ^{238}U, and ^{154}Eu) detected in the borehole, naturally occurring radionuclides (^{40}K, ^{238}U, ^{232}Th [KUT]), a combination of man-made, KUT, and dead time, and total gamma plotted with dead time. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, casing corrections, or water corrections. A repeat log section is also included.

Results and Interpretations:

^{137}Cs, ^{60}Co, ^{238}U, and ^{154}Eu were the man-made radionuclides detected in this borehole. ^{137}Cs was detected between 25 and 64 ft and at a few sporadic locations in the borehole near its MDL of approximately 0.1 pCi/g. The maximum concentration was measured at approximately 400 pCi/g at 39 ft.

^{60}Co was detected near its MDL of 0.05 pCi/g at depths of 39 to 44 ft, 131 ft, and 205 to 208 ft.

^{154}Eu was detected near its MDL of 0.2 pCi/g at 32 and 42 ft.

Historical gross gamma logs (Fecht et al. 1977) indicate gamma activity above background levels between approximately 5 and 60 meters (16-200 ft) in 1958. Significant decay had occurred by 1976. On the basis

of the current SGLS log data, this activity can be attributed, at least in part, to the above mentioned radionuclides.

Elevated radon existed in the borehole during log runs 1 and 2. The repeat section between 45 and 67 ft shows a comparison of naturally occurring ^{238}U data acquired in log 2 with log run 3. The difference of about 0.5 pCi/g is the result of enhanced radon in the borehole. Otherwise, the repeat section indicated good agreement of the naturally occurring KUT.

References:

Fecht, K.R., G.V. Last, and K.R. Price, 1977. *Evaluation of Scintillation Probe Profiles from 200 Area Crib Monitoring Wells*, ARH-ST-156, Atlantic Richfield Hanford Company, Richland, Washington.

Ledgerwood, R.K., 1993. *Summaries of Well Construction Data and Field Observations for Existing 200-East Resource Protection Wells*, WHC-SD-ER-TI-007, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

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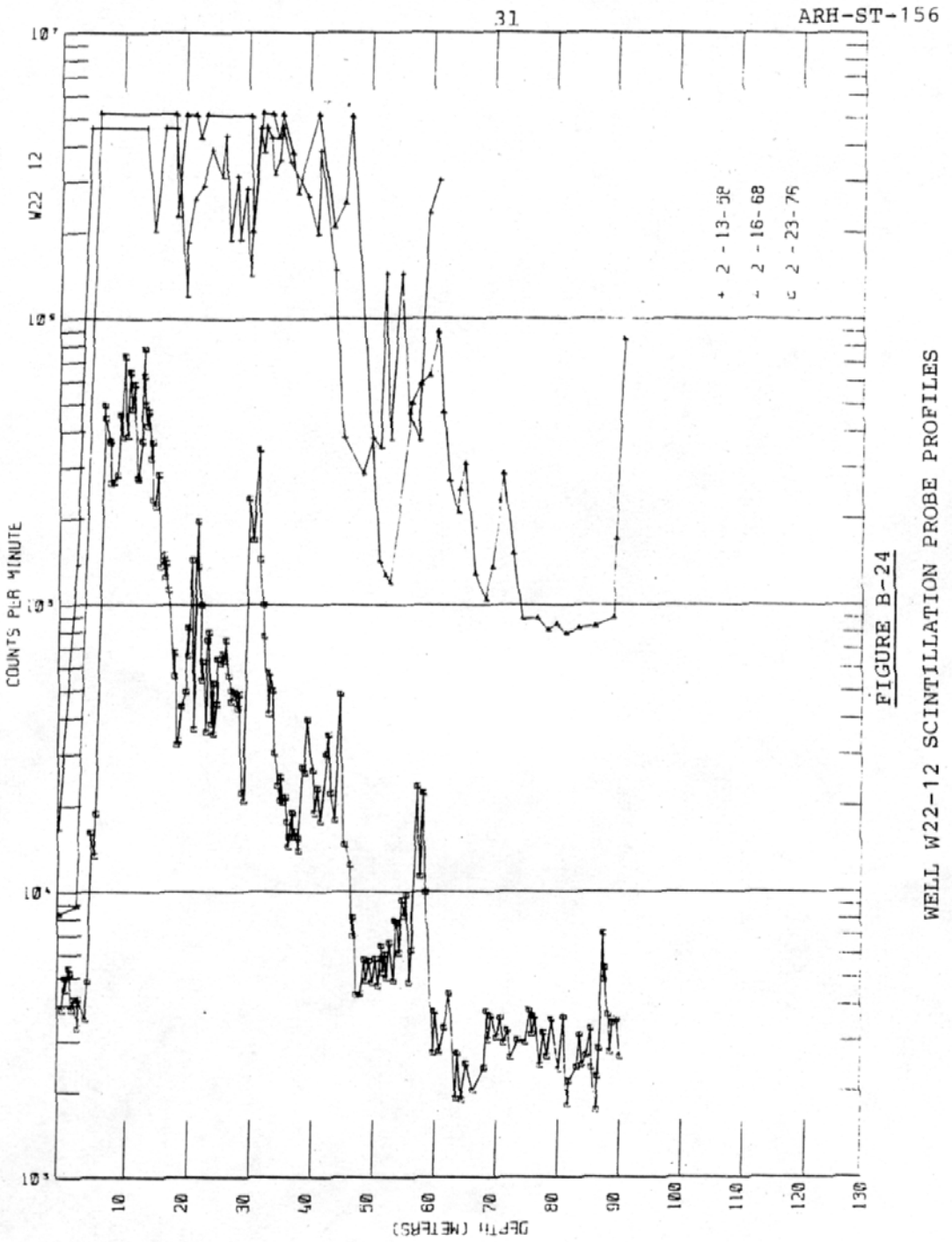
[1] GWL – groundwater level
[2] TOC – top of casing
[3] HWIS – Hanford Well Information System
[4] N/A – not applicable



from Fecht et al. (1977)

Scintillation Probe Profiles for Borehole 299-W22-12, Logged on 2/13/58, 2/16/68, and 2/23/76

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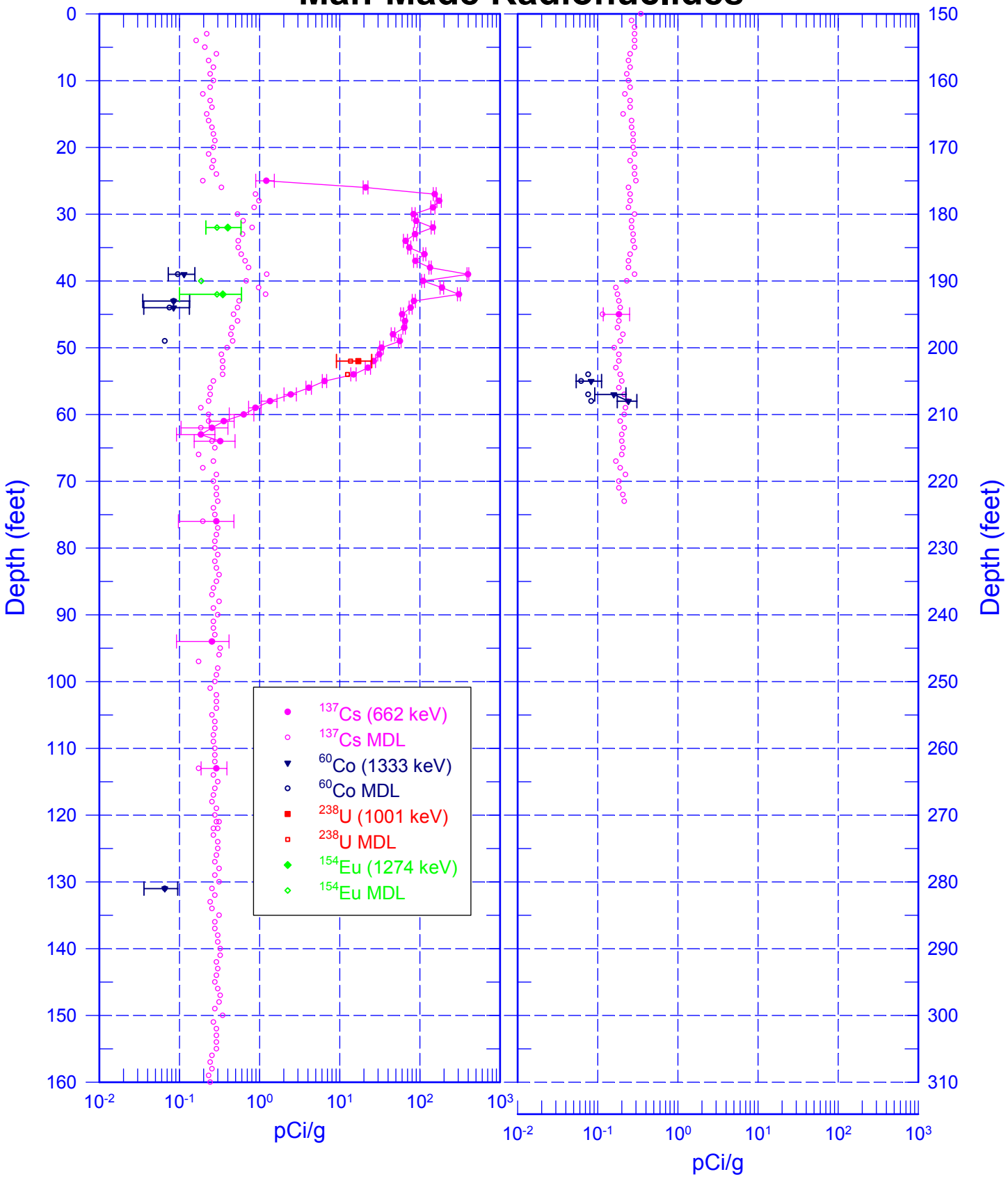
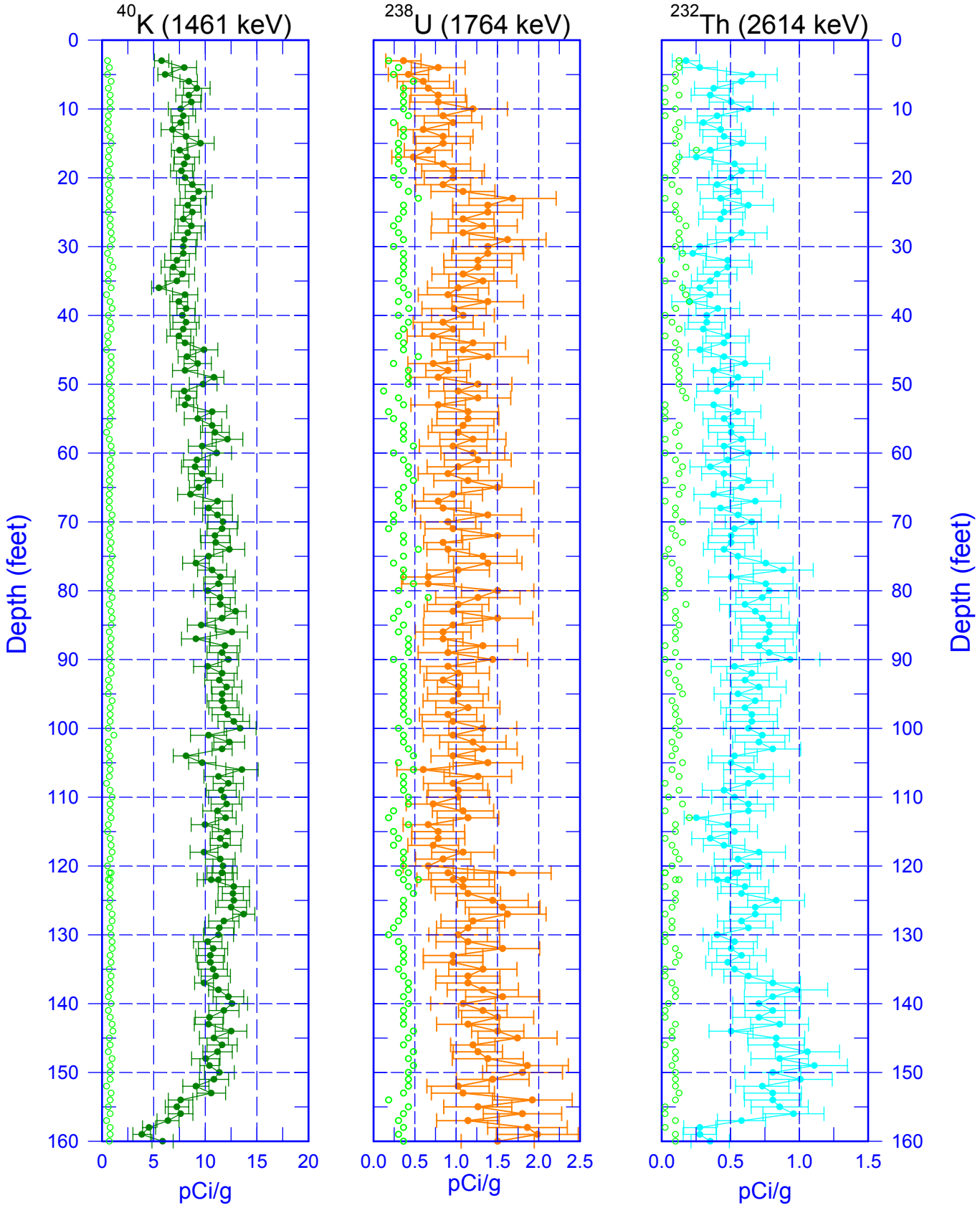
Man-Made Radionuclides



Zero Reference - Top of Casing

Last Log Date - 05/06/04

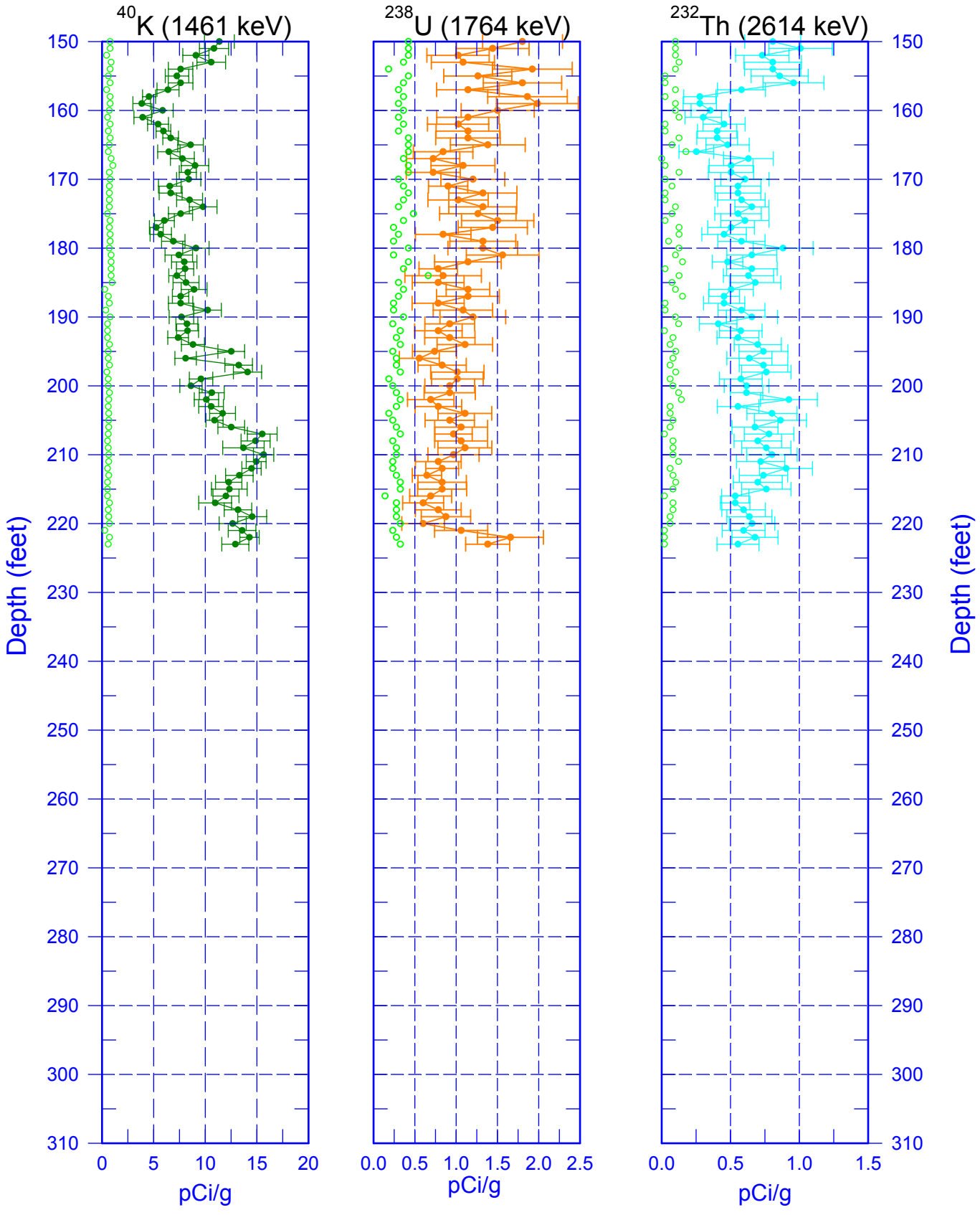
299-W22-12 (A7837)
Natural Gamma Logs



Zero Reference = Top of Casing

Last Log Date - 05/06/04

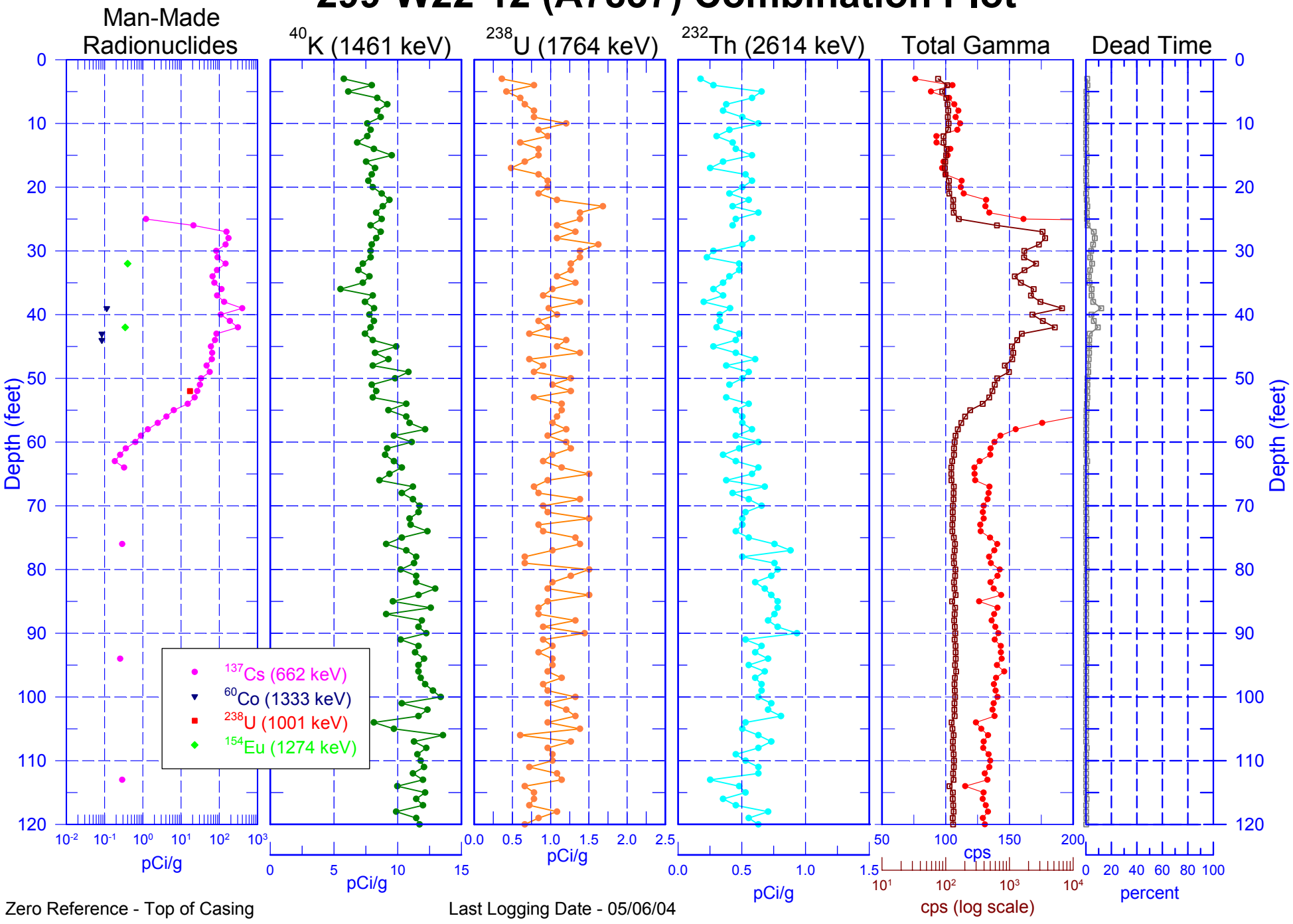
299-W22-12 (A7837)
Natural Gamma Logs



Zero Reference - Top of Casing

Last Log Date - 05/06/04

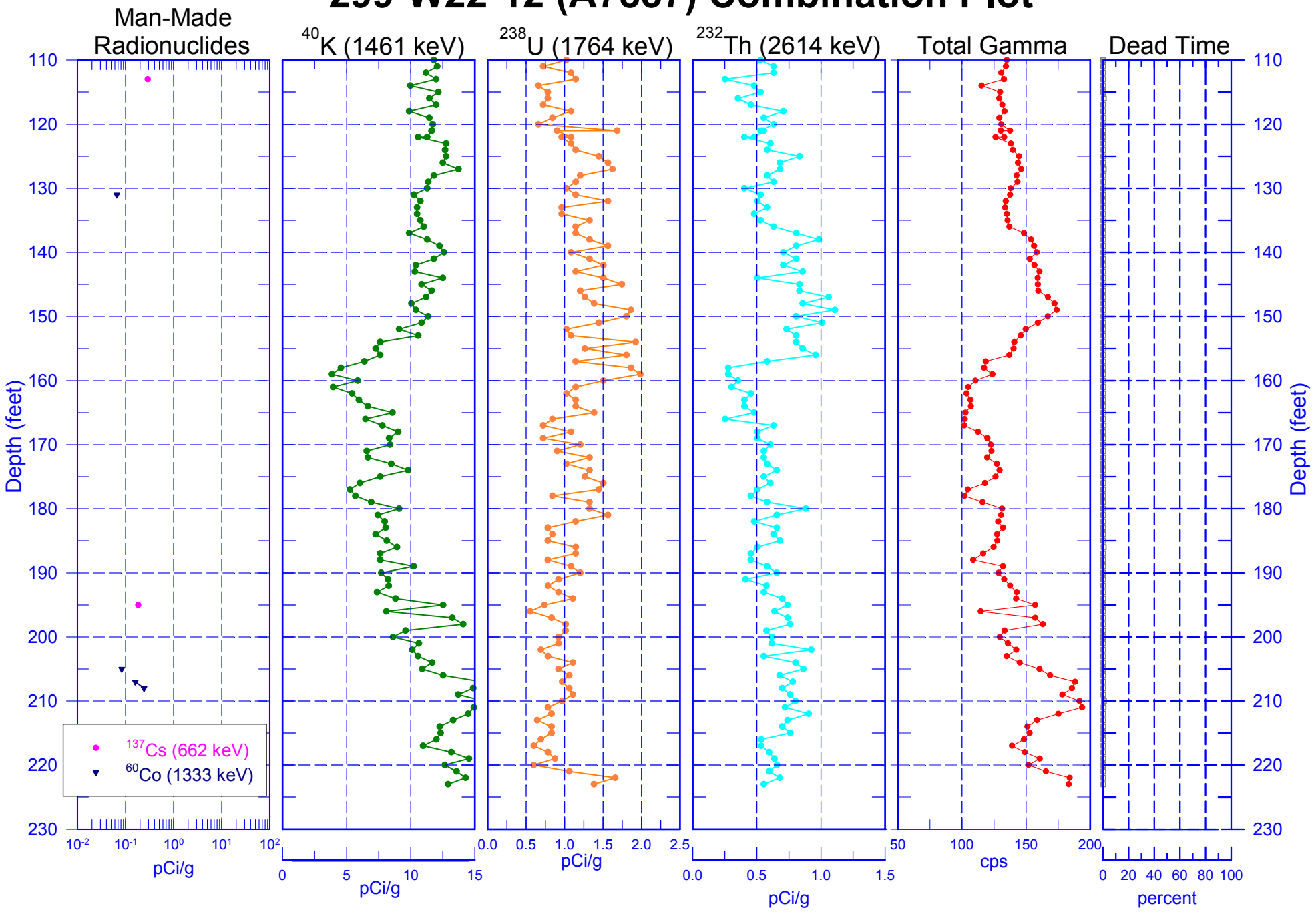
299-W22-12 (A7837) Combination Plot



Zero Reference - Top of Casing

Last Logging Date - 05/06/04

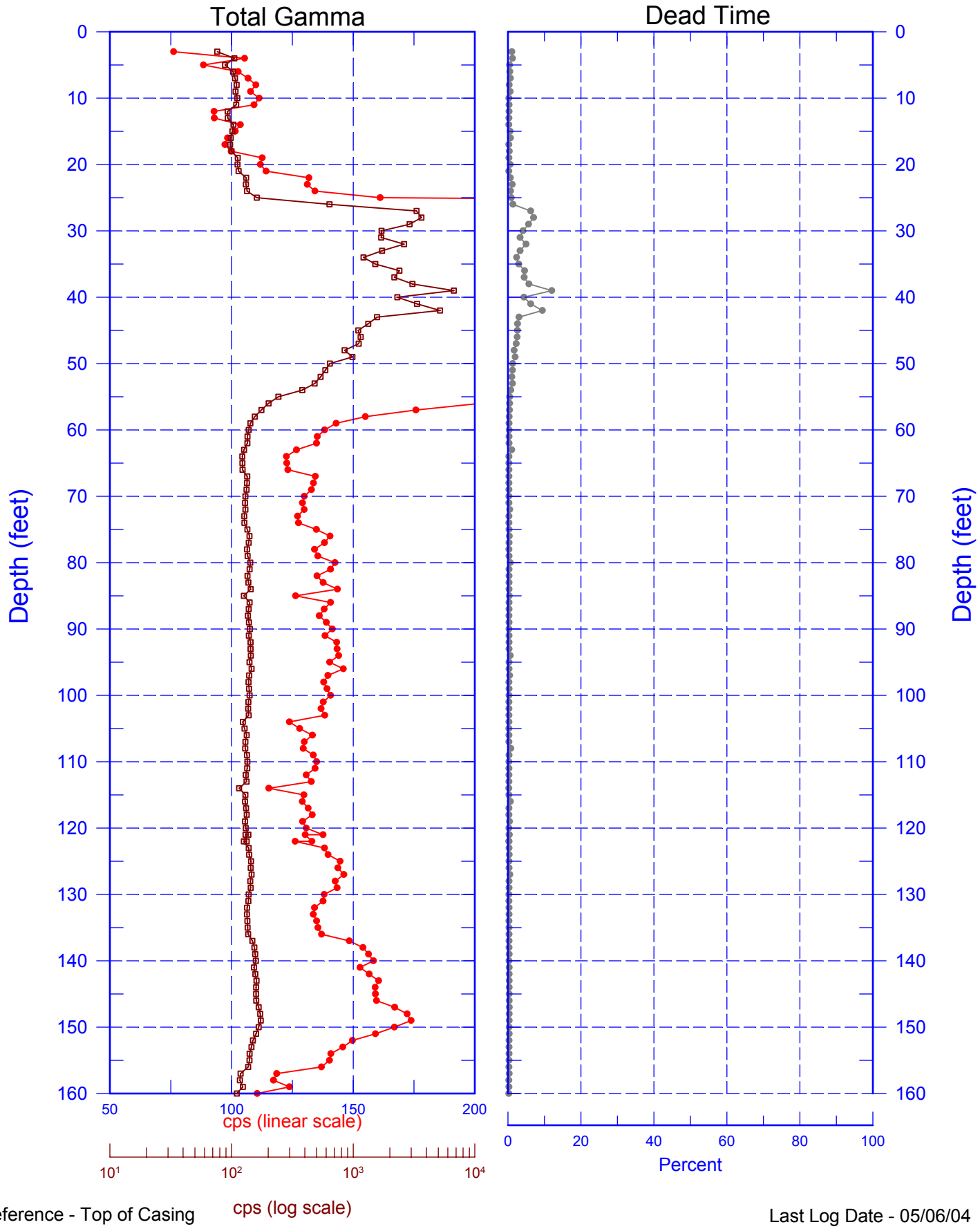
299-W22-12 (A7837) Combination Plot



Zero Reference - Top of Casing

Last Logging Date - 05/06/04

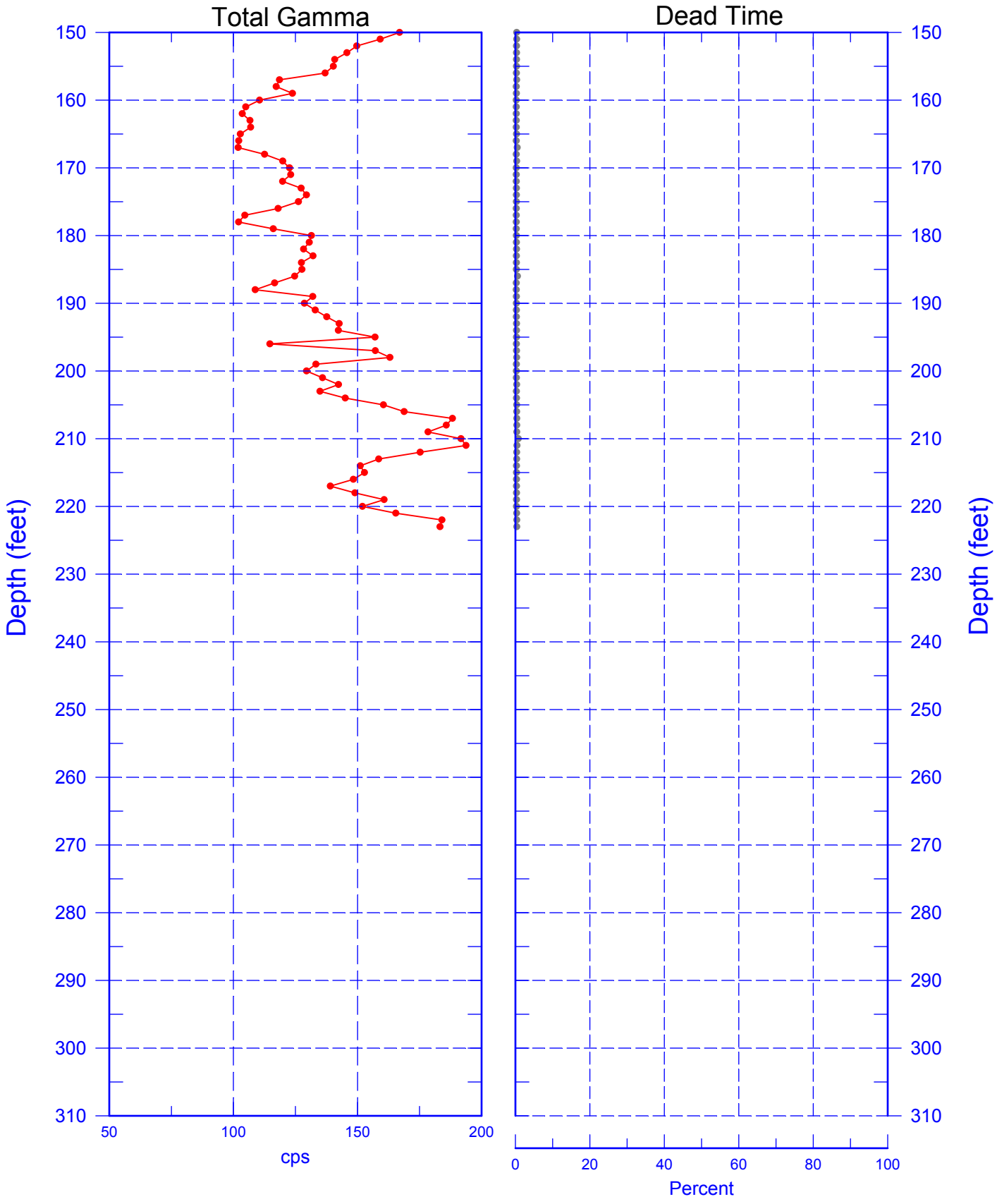
299-W22-12 (A7837)
Total Gamma & Dead Time



Reference - Top of Casing

Last Log Date - 05/06/04

299-W22-12 (A7837)
Total Gamma & Dead Time



Reference - Top of Casing

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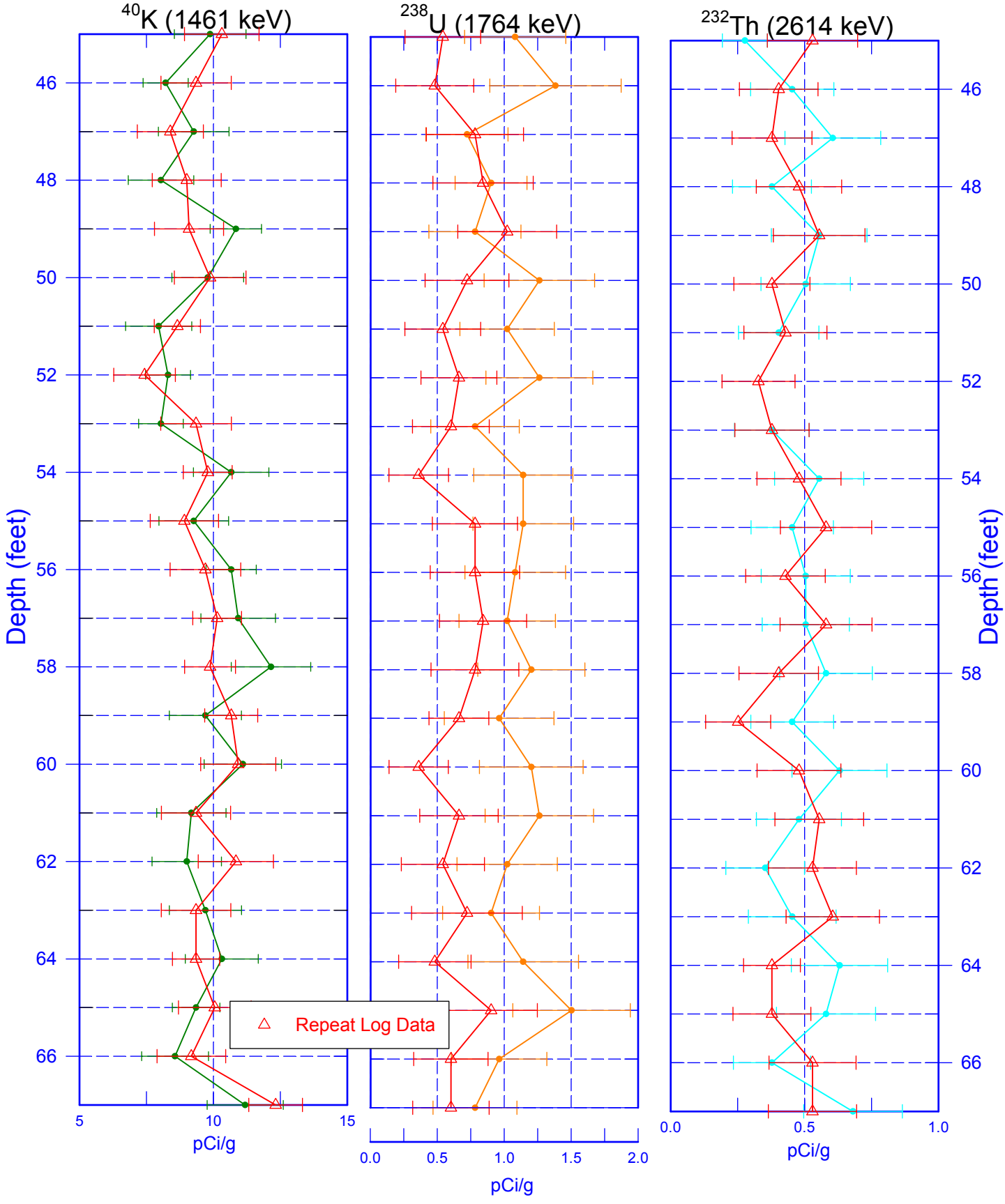
Repeat Section of Natural Gamma Logs



Zero Reference - Top of Casing

Last Log Date - 05/06/04